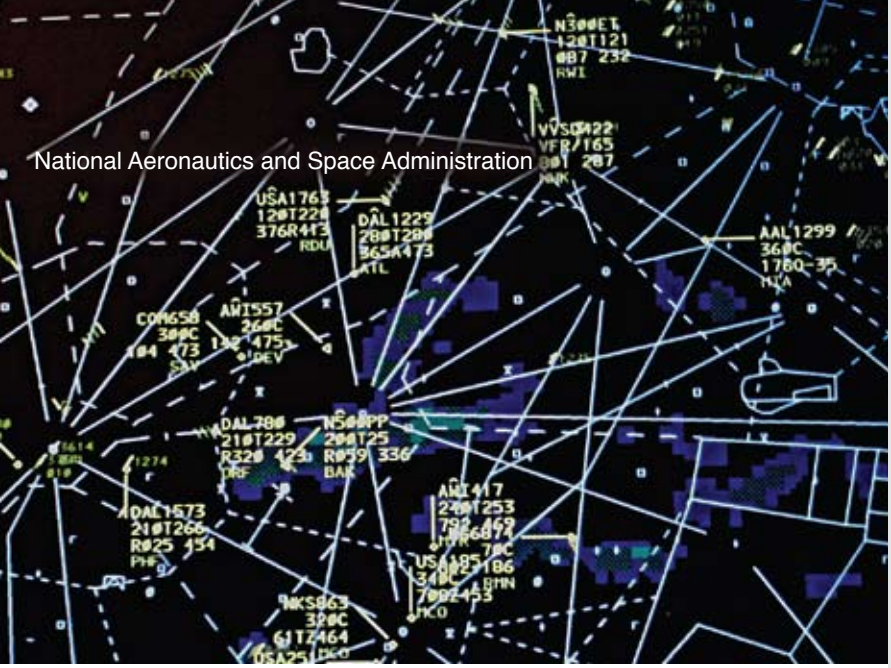


NASA Langley's
Power Technology for High-Altitude Airships

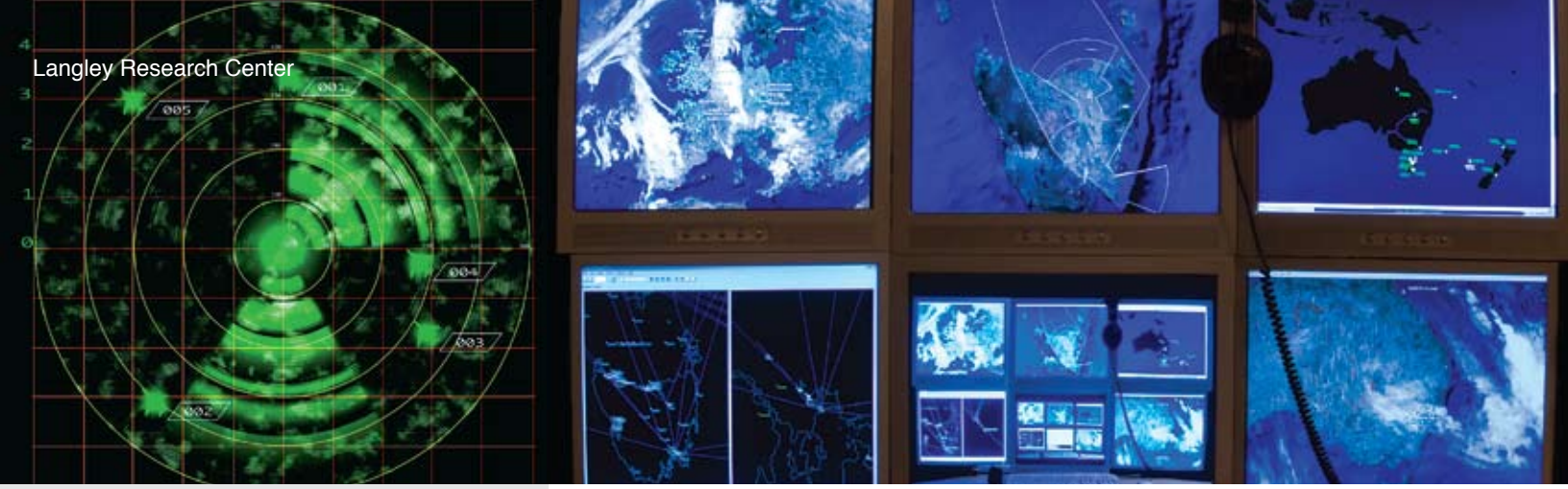
Advanced thermoelectric materials form the foundation to a novel approach to powering high-altitude airships

NASA Langley researchers have developed a unique concept for providing electrical power to high-altitude airships (HAA). These airships are intended to remain aloft at high altitudes for extended periods of time for various potential scientific, commercial, and defense uses. Powering HAA presents a challenge due to the extended periods between possible refueling and the weight restrictions of these lighter-than-air airships. The NASA approach combines the high-performance thermal energy harvesting capabilities of advanced thermoelectric materials with a novel elliptical airship cross-section to maximize solar gain.

Benefits

- Enables remote operation of high-altitude airships for extended operational time periods
- Builds upon extensive expertise on advanced thermoelectric materials at NASA
- High conversion efficiency provided by nanotechnology-based thermoelectric materials under development at NASA
- Converts solar energy in the form of heat directly to electricity
- Minimizes weight compared to other solar power options such as photovoltaics
- Patent application filed

partnership opportunity



Applications

The technology offers wide-ranging market applications, including:

- Defense surveillance and logistical coordination
- Operation of HAA-based directed energy weapons
- Real-time and constant monitoring of various commercial activities such as forestry, agriculture, or mariculture
- Monitoring of traffic systems, including air traffic, maritime traffic, and others
- Scientific studies of atmospheric and other environmental processes

The Technology

The NASA HAA power technology leverages NASA technology in advanced thermoelectric materials to create an advanced system for powering HAA. Conventional airships operate at low altitudes and are readily brought to docking for refueling and resupply. However, HAA are intended to remain aloft for extended periods of time, and thus represent a challenge for providing operational power. The potential uses of such HAA are very significant, however, ranging from scientific studies to monitoring and coordination of various commercial activities to various defense-related applications. Carrying fuel on-board is not possible due to weight and volume limitations. The energy must be harvested from the environment; in particular, solar offers an intense source of power, especially at the high altitudes where these lighter-than-air airships are intended to operate. The advanced thermoelectric materials developed by NASA offer distinct weight and performance advantages over conventional photovoltaic systems, and convert the energy from solar radiation in the form of heat directly into electricity. Furthermore, the airship is designed with a flattened or slightly elliptical cross-section to maximize capture of the solar energy.

For More Information

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

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